FY 2000
COMMUNITY IPM REPORT

Impact of Scarab Grub Management Tactics on Non-Target Soil Fauna

Project Leader: Mike Villani

Collaborators: Leslie Allee, Nancy Consolie, Paul Robbins, and Jennifer Grant

Department of Entomology
NYSAES/Cornell University
Geneva, NY 14456

FY 2000
COMMUNITY IPM REPORT

Type of Project: Research and Demonstration

Title: Impact of Scarab Grub Management Tactics on Non-Target Soil Fauna

Location: Turf area at NYSAES in Geneva, NY

Project Leader: Mike Villani

Collaborators: Leslie Allee, Nancy Consolie, Paul Robbins, and Jennifer Grant

Abstract

This study compared the effect of turfgrass pest management tactics, available to homeowners, on beneficial and nontarget soil fauna. Management products tested included insecticides Merit, Dylox, and Sulfur, an insect growth inhibitor Mach2, and a natural enemy or biological control, nematodes. To measure numbers of nontarget organisms samples were taken from treated and untreated turf plots using pitfall traps, soil cores, and baited ant traps from June through September. We found numbers of beetles, spiders, sow bugs, earthworms, ants, and crickets in treated plots were not significantly lower than numbers in control plots. Using this information, decisions for treatment of turfgrass and educational materials on turfgrass management will be able to include consideration for the impact on nontarget beneficial organisms.

Objectives

- Understand the effect of pest management strategy on nontarget beneficial organisms in turfgrass.
- Compare the effect of the three main types of insecticides used against turfgrass pests on nontarget beneficial organisms in turfgrass.
- Generate specific information on the effect of pest management options on beneficial organisms in turfgrass that can be used in educational materials such as brochures and fact sheets on turfgrass IPM.

Methods

Turfgrass plots, 10 x 10 meters, were established on a Crittenden field area at NYSAES, Geneva, NY. Plots received one of six treatments: the insecticides trichlorfon or Dylox 6.2 (Bayer), imidacloprid or Merit .3G (Bayer), MachII 1.5G (American Cyanimid), the growth inhibitor halofenozide, the entompathogenic nematode *Heterorhabditis bacteriophora*,(IPM Labs, Locke, NY), sulfur (Fernz Sulfer Works), and an untreated control. Plots were replicated four times for a total of 24 test plots. Buffer zones, 10 x 10 meters, separated each test plot on all sides. Treatments were made on

June 20, 2000 using Merit at 3lb/100 square feet, Mach2 at 2.3lb/1000square feet, and Sulfur at 10lb/1000 square feet. Nematodes were applied on June 21 at 20 million/1000 square feet. On July 28, Dylox was applied at 8lb active ingredient/acre, and a Sulfur application was repeated as above.

The density of beneficial and nontarget organisms such as predatory carabid and staphylinid beetles, spiders, sow bugs, earthworms, crickets and ants were sampled using pitfall traps, soil cores, and ant traps baited with tuna. Plots were sampled weekly, the week before treatment and for 13 weeks after treatment, from June 19, 2000 through September 22, 2000. During sampling weeks, on Day 1 in each plot, a soil core was taken, a pitfall trap was set into the hole from the soil core, and two tuna traps were baited and placed in the soil; twenty-four hours later on Day 2 in each plot, pitfall traps were collected, soil core holes refilled, and tuna traps collected.

Soil cores were dug using a 4-inch diameter stainless steel soil corer and the soil hand sorted. Pitfall traps, 6 inch diameter x 4 inch deep with screen bases, were monitored after 24 hr. Tuna traps were 1 ml plastic centrifuge tubes with a small amount of canned tuna (packed in oil) placed in the bottom third of the tube. The tubes were buried with the top at ground level and monitored after 24 hr. One soil core, one pitfall trap, and two tuna traps were used for each treatment plot, on each sampling date. Invertebrates collected from soil cores, pitfall traps, and tuna traps were processed, identified, and preserved.

Counts of mean invertebrates per trap were compared in treated and untreated plots by analysis of variance using the general linear model (GLM) procedure available in PC-SAS.

Results

Nontarget and beneficial soil fauna found in traps included beetles (Carabidae, Staphylinidae, Scarabaeidae, Elateridae, Cicindellidae, Curculionidae), spiders (Lycosidae), sow bugs and pill bugs (Oniscus and Armadillium spp.), earthworms (Lumbricidae and Allolobophora spp.), ants (Formicidae), and crickets (Gryllus spp.). Millipedes, centipedes, Hymenoptera, slugs, and flies were also occasionally collected.

Although differences in densities of beneficials might be expected in control versus treated plots, with more beneficials in untreated control plots, this was not the case. Based upon our understanding of these turfgrass pest control tactics we assumed that the impact of specific treatments would be: trichlorfon > imidacloprid > Sulfur > Halofenozide = *Heterorhabditis bacteriophora* = untreated control. However, numbers of beetles (Fig. 1), spiders (Fig. 2), sow bugs (Fig. 3), and earthworms (Fig. 4) in treated plots were not significantly lower than numbers in control plots. Numbers of ants and crickets were more variable but also were not significantly lower in treated plots compared to control plots.

Using this information, recommendations for treatment of turfgrass and educational materials on turfgrass management will be able to include consideration for the impact on beneficial organisms.

Fig. 1. Beetle numbers in treated plots are not significantly lower than in control plots.

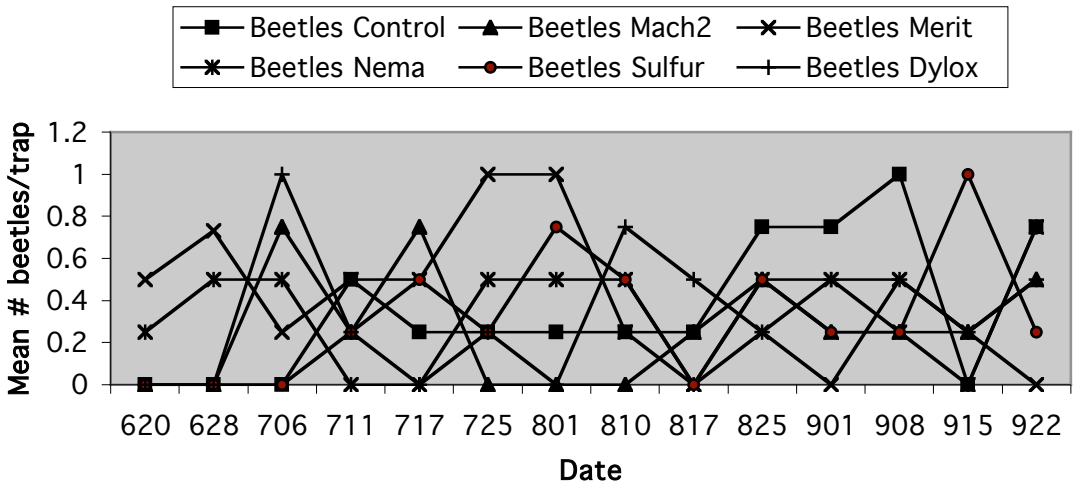

Fig. 2. Spider numbers in treated plots are not significantly lower than in control plots.

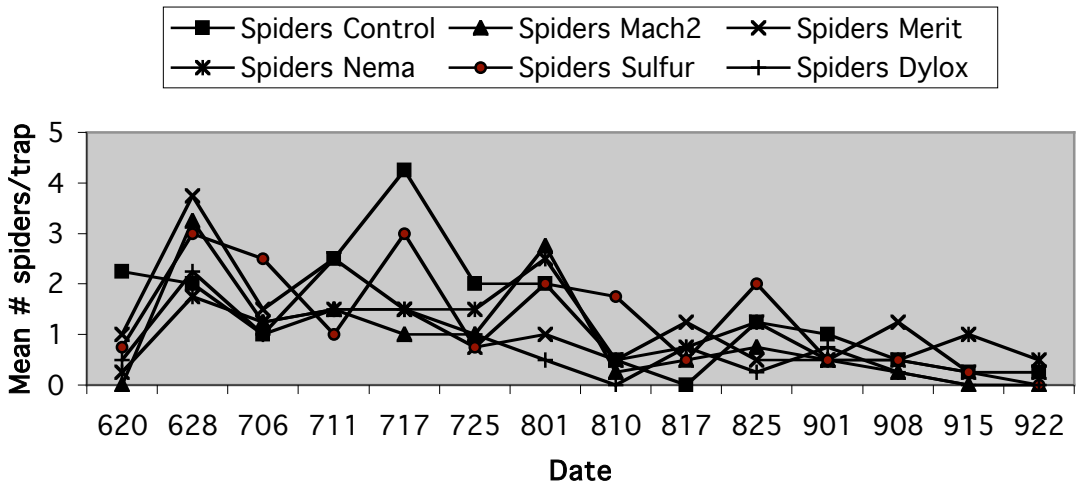

Fig. 3. Sow Bug numbers in treated plots are not significantly lower than in control plots.

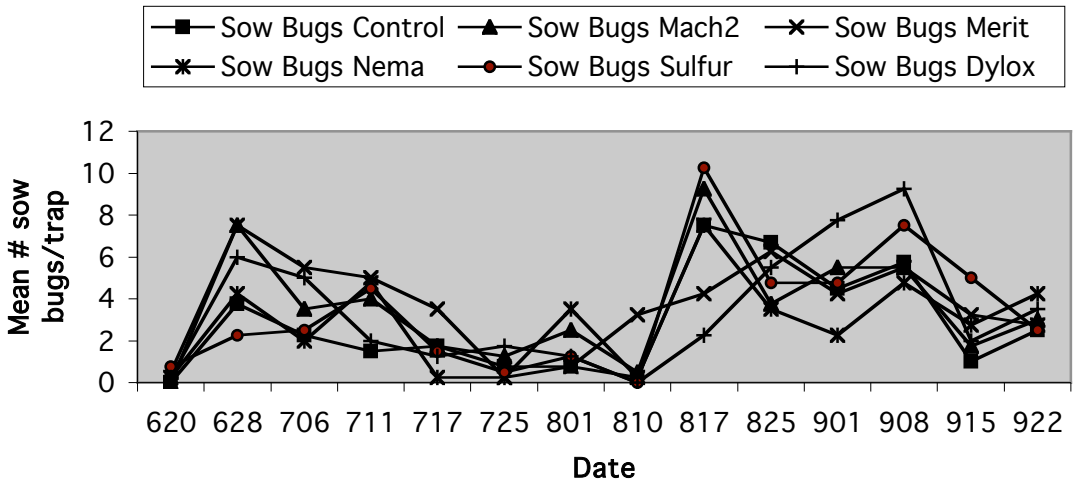

Fig. 4. Worm numbers in treated plots are not significantly lower than in control plots.